# Setting up and Hosting a Web-based SDR

Bruce P. Johnson, KX4AZ
kx4az@arrl.net
Athens (GA) Radio Club
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# Outline

- Why set up an online SDR?
- Hardware/software options - browser based versus dedicated software
- Receive-only antennas versus all purpose - sharing with a transceiver
- Public access considerations - IP addressing, bandwidth, NAT security, etc
- Keeping things alive while unattended

# Three Disclaimers…

1. Say what?
2. One week ago, I lost ½ of my wisdom…
3.

# Why set up an online SDR?

- Public service - “a good antenna is a *terrible* thing to waste” (Bruce, KX4AZ)...*share* that panadapter view!
- Radio “ears” for the signal impaired
- Checking modulation/splatter via area receiver
- Compare antenna receive performance to your peers
- Motivate receiving improvements (noise reduction, S/N focus)
- Leap the skip zone by accessing distant SDRs

# Hardware/Software Options - Browser Accessible

Browser based access to these server types…

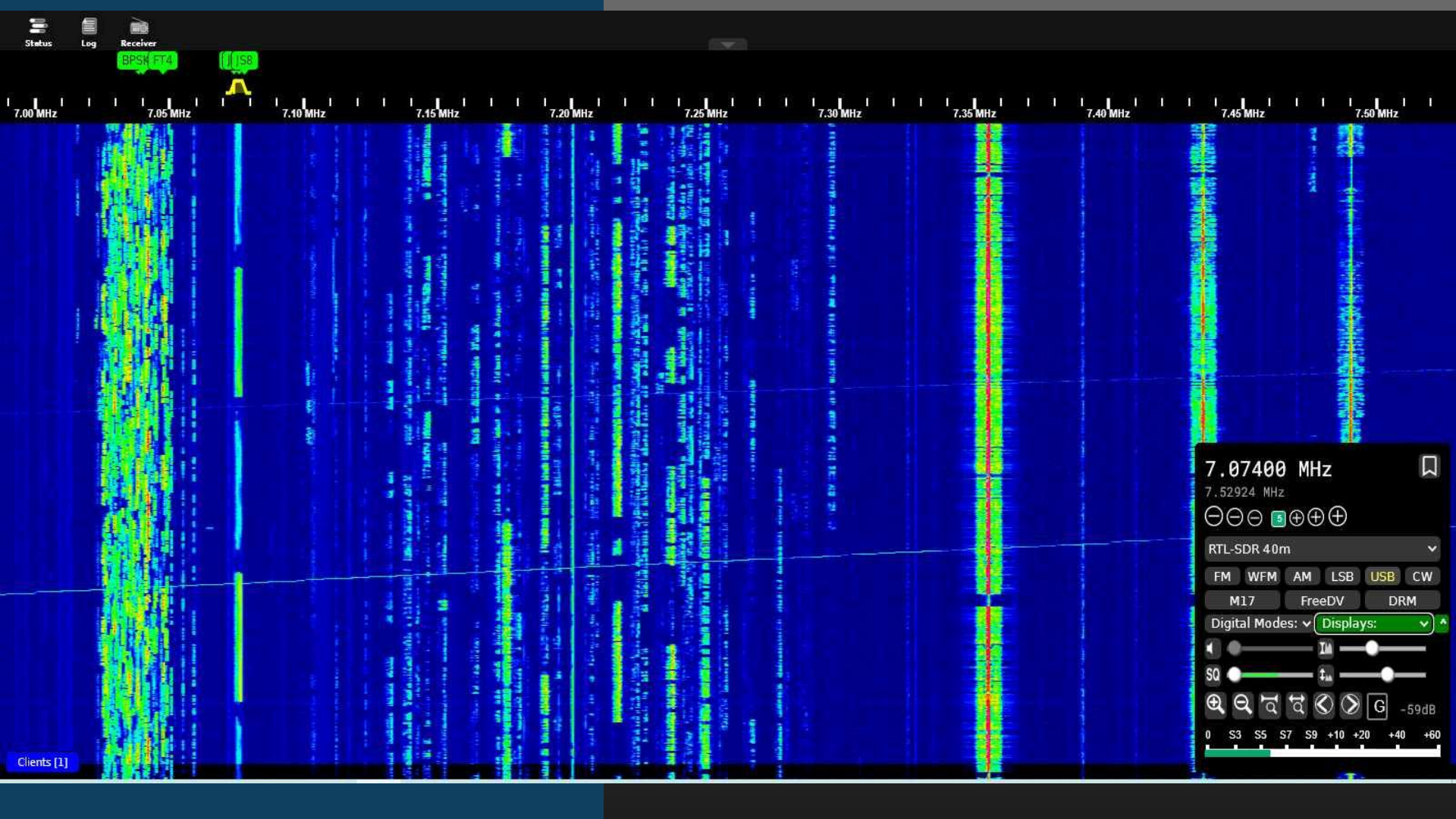
- *WebSDR* (websdr.org) - massive user capacity, Linux only, example:Lumpkin SDR in Dahlonega
- *KiwiSDR* - plug & play, server pre-installed, 0-30 MHz simultaneous view, 8 simultaneous users maximum, used for ‘KX4AZ/A’ SDR
- *OpenWebRX* - use RTL-SDR, Airspy HF+, SDRPlay etc., Linux based, Pi image available

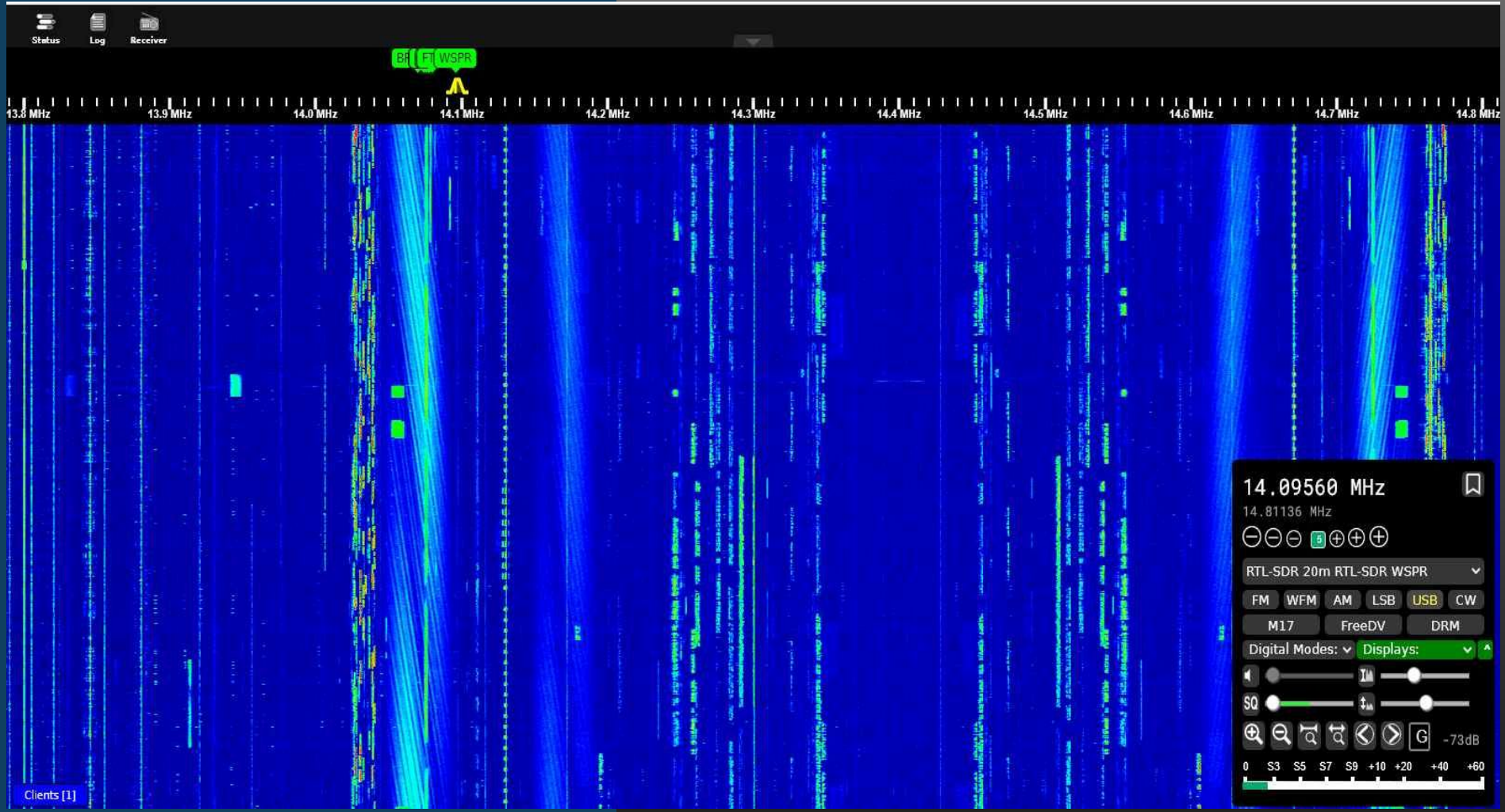
# Hardware/Software Options - Non-browser Receiver Software

- *Spyserver* (airspy.com) - works with RTL-SDR, Airspy HF+, SDRPlay etc.  Spyserver runs on Windows or Linux.  Access via SDR#.
- *SDR Console* (sdr-radio.com) - Windows *only*
- *SDR*++ (sdrpp.org)
- *SDRuno* (sdrplay.com)

# **OpenWebRX** Software (openwebrx.de)

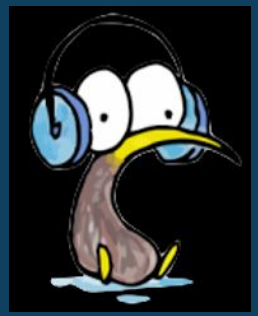
- Web interface to access, configure
- Linux based; Pi4 disk images for turnkey solution
- Compatible with RTL-SDR, Airspy, SDRplay etc SDRs
- Compatible with SDRPlay devices (8-10 MHz bandwidth)

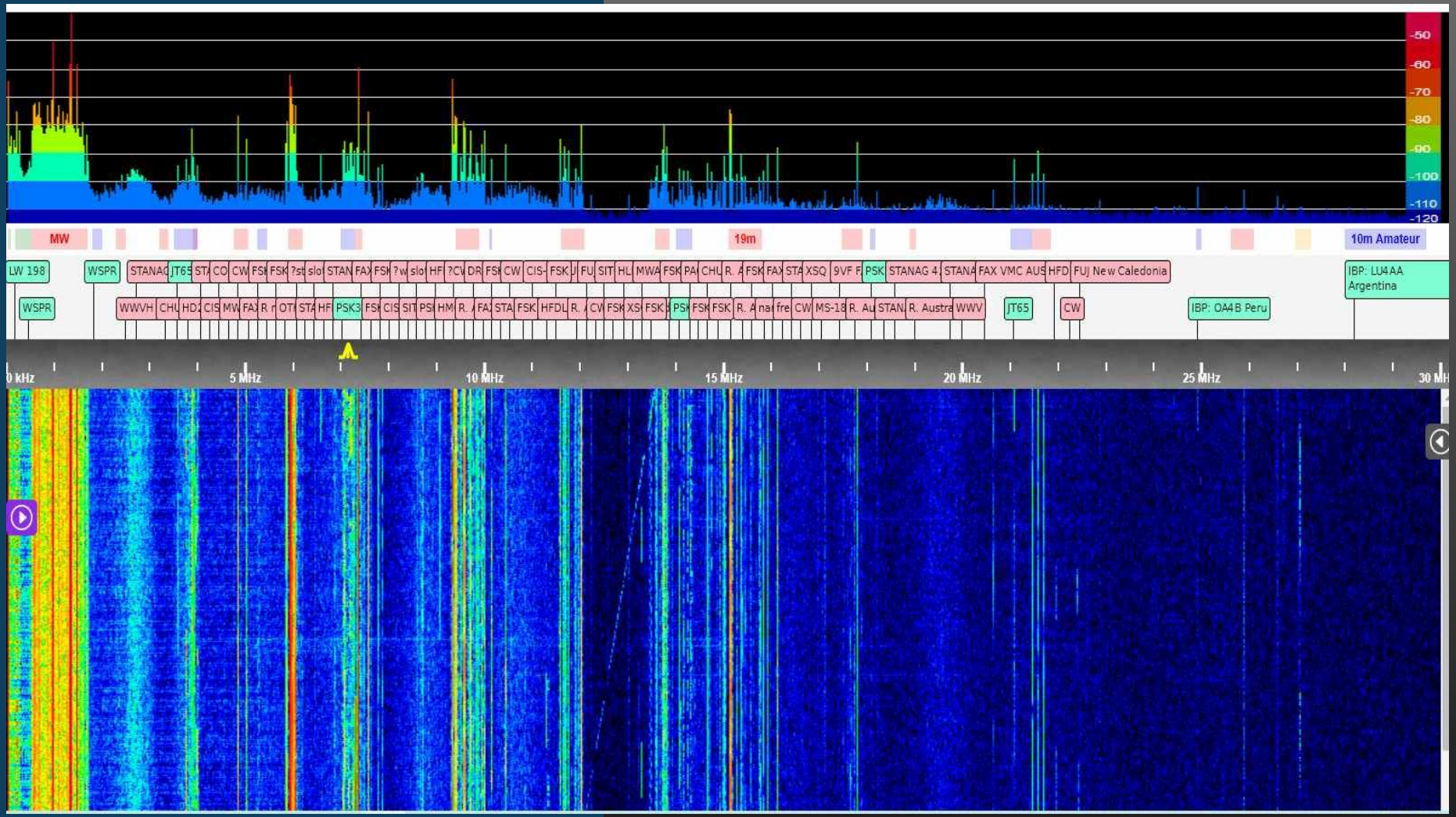

Status
Log
Receiver
BPSK FT4
JS8
7.00 MHz
7.05 MHz
7.10 MHz
7.15 MHz
7.20 MHz
7.25 MHz
7.30 MHz
7.35 MHz
7.40 MHz
7.45 MHz
7.50 MHz
7.07400 MHz
7.52924 MHz
RTL-SDR 40m
FM
WFM
AM
LSB
USB
CW
M17
FreeDV
DRM
Digital Modes:
Displays:
SQ
G
-59dB
0
S3
S5
S7
S9
+10
+20
+40
+60
Clients [1]


Status
Log
Receiver
BP
FT
WSPR
13.8 MHz
13.9 MHz
14.0 MHz
14.1 MHz
14.2 MHz
14.3 MHz
14.4 MHz
14.5 MHz
14.6 MHz
14.7 MHz
14.8 MHz
14.09560 MHz
14.81136 MHz
RTL-SDR 20m RTL-SDR WSPR
FM
WFM
AM
LSB
USB
CW
M17
FreeDV
DRM
Digital Modes:
Displays:
SQ
G
-73dB
0
S3
S5
S7
S9
+10
+20
+40
+60
Clients [1]

# KiwiSDR Online SDR @KX4AZ

- 0-30 MHz full bandwidth display
- Current URL (as of March 2023): athenshouse.ddns.net:46708
- Up to 8 simultaneous users (2 w/full waterfall, 6 w/audio FFT)
- EFHW 80-10 antenna, 35’ AGL
- antenna shared with ICOM 7300




-50
-60
-70
-80
-90
-100
-110
-120
MW
19m
10m Amateur
LW 198
WSPR
IBP: LU4AA Argentina
WSPR
JT65
CW
IBP: OA4B Peru
0 kHz
5 MHz
10 MHz
15 MHz
20 MHz
25 MHz
30 MH

# Baby Steps…try out Spyserver

- Install RTL-SDR etc on a Windows PC, get comfortable with using SDR# to access
- Install Spyserver on the same PC, configure
- Access on your LAN via SDR# software
- Set up outside access (port forwarding or VPN w/port forwarding)

# More advanced steps…use OpenWebRX or WebSDR on a Pi4 or Linux PC

- Install OpenWebRX or WebSDR on a Linux PC or Raspberry Pi
- Configure software for the specific SDR and desired bands
- Access via you LAN to fine tune settings
- Set up WAN side access via port forwarding or VPN etc.

# Receive Only Antennas - Break Some “Rules”

- Reciprocity for transmit/receive - yes, BUT….

  ….non-resonant, poor match, no LNA, no problem - IF it passes the noise floor test!

- Noise floor test - does the noise floor increase when the antenna is connected to the feedline?
- Feedline options - coax (RG-6, RG-8x, ethernet twisted pair, ladder line, etc)...unmatched line loss *much* more tolerable for RX-only
- Don’t forget the common mode choke(s) “CMC”
- Beware strong broadcast stations (AM/FM) - may require filter to prevent overload, “I’m talking to you, RTL-SDR!”

# Hosting Considerations

- Know your ip addresses and behavior (LAN, WAN, CG-NAT (“Double-NAT”)
- Use port forwarding, VPN etc to reach from outside
- Dynamic ip address? Use no-ip.com etc
- Know your upstream internet bandwidth (speedsmart.net)....figure 100kbits/second per user

- Sharing antenna with transceiver? Need an automatic switch (MFJ-1708B etc)

# Adding protection to the LAN…

- Use non-standard port #s; i.e. NOT ports like 80, 8080, 8001, 8073, etc that are in software defaults
- Ideally, segment your LAN so that the IOT and SDR devices are walled off from the rest of the network
- Segment using router such as Ubiquiti ER-X edgerouter (Amazon, $58).

# Keeping things alive at a remote site…

- Lightning arrestor, and thorough grounding a la Ward Silver N0AX, and *hope for the best*
- Appliance timer(s) or wifi controlled power outlet(s)
- Power failures can be your friend!
- Internet connection monitor - auto reboot modem with loss of connectivity
- A friend/neighbor you trust!

# Your homework assignment…

- Set up that unused SDR (RTL-SDR, SDRPlay, Airspy) with Spyserver or OpenWebRX or SDR Console or SDR++ etc.
- Share the internet address at ARC groups.io
- Compare your antenna/noise performance to others in the area
- Experiment with CMC at rig and where coax enters the house

# Online SDR Resources

- “University of YouTube”
- RTL-SDR.com (all things SDR related)
- Openwebrx.de (openwebrx software)
- Airspy.com (Spyserver, SDR# software)
- Kiwisdr.com (KiwiSDR map, forum)
- Lumpkin WebSDR (Dahlonega, GA) http://websdr.lumpkinschools.com/

# Networking Resources

- Ngrok.com (tunneling through CG-NAT)
- Cloudflare tunnel (tunneling through CG-NAT)
- Tailscale.com (mesh VPN across devices at different sites)
- Zerotier.com (mesh VPN across devices at different sites)
- PureVPN.com (example commercial VPN with port forwarding option)

That's all Folks!